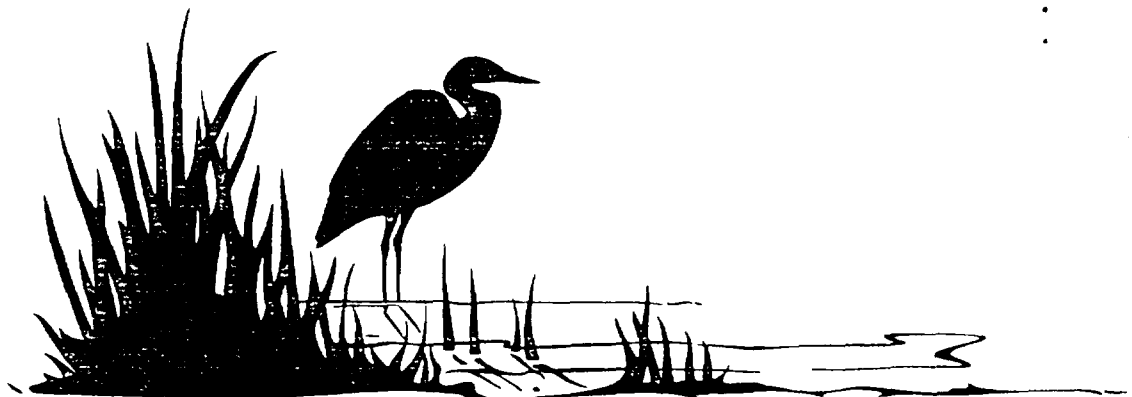


**Study Plan for the Analyses of
Seafood from Terry and Dupree Creeks
Brunswick, Georgia
February 1997**



**Georgia Department of Natural Resources
Environmental Protection Division
Floyd Towers East
205 Butler Street, S.W.
Atlanta, Georgia 30334**

**Study Plan for the Analyses of
Seafood from Terry and Dupree Creeks
Brunswick, Georgia
FEBRUARY 1997**

Introduction

In 1996, EPD reviewed data collected in the Terry and Dupree Creek areas (Final Report For The Collection and Analysis Of Fish And Crab Tissue From Terry And Dupree Creeks, prepared by Law Engineering and Environmental Services, Inc. for Hercules Incorporated Resins Division, April, 1996). Collections of fish and crabs were made during October 1995, and analyzed for 21 pesticides, including Toxaphene, and PCBs. The data consisted of one spotted seatrout composite tissue sample from Terry Creek, and four blue crab composite tissue samples (two from Terry Creek, one from Dupree Creek, and one from Belle Point Creek). No pesticides, including Toxaphene, were detected in any of the samples. Quantitation limits were 0.10 mg/kg in crab tissue and 0.25 mg/kg in fish tissue. In February, 1997, EPD learned that samples of *Fundulus heteroclitus* (mummichog / killifishes) collected in the Terry Creek area by U.S. EPA had concentrations of toxaphene approaching 20 mg/kg after whole body analyses (personal communication, Leo Francendese, U.S. EPA.)

As a result of growing concerns regarding possible contaminants in fish in the Brunswick area, and the analyses reported in 1997 by U.S. EPA, the EPD will collect seafood samples from the Terry and Dupree Creek area in the spring of 1997. Shrimp, blue crabs, and fish species which anglers may be expected to catch in the area will be collected.

The overall objective of the project is to provide sufficiently detailed information regarding fish tissue contaminants in the vicinity of Terry and Dupree Creeks to allow development of risk-based fish consumption guidelines. Specific aims include:

1. To collect edible fillet composites of two finfish species, shrimp, and crab from four sites in the vicinity of Terry and Dupree Creeks.
2. To analyze all samples for pesticides, PCBs, and metals listed in Attachment 1.
3. To develop consumption guidelines for the area using an approach consistent with that used on other waterbodies in Georgia.

Study Area

Samples will be collected from sites on both Dupree and Terry Creeks. Four sample locations have been identified, three in Terry Creek and one in Dupree Creek. These sites are listed below and identified in Figure 1.

Site A: Terry Creek @ Lanier basin/overlook (Brunswick Marina Area).

Site B: Terry Creek @ the Torras Causeway Bridge.

Site C: Terry Creek @ 3/4 mile West of the confluence with the Back River.

Site D: Dupree Creek.

Sample Collection and Preparation

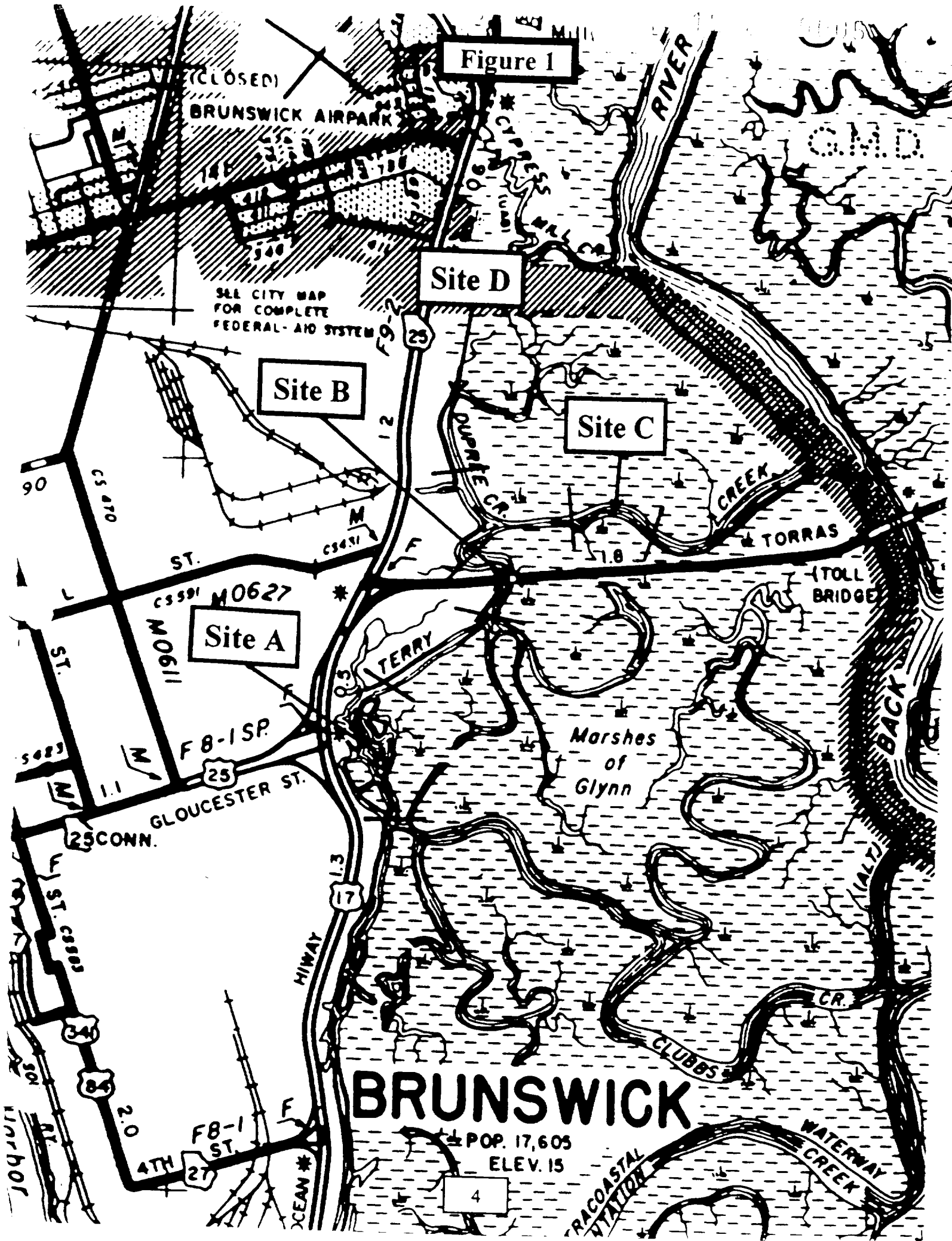
Samples will be collected and prepared for delivery by the Coastal Resources Division (CRD) of the Georgia Department of Natural Resources, as described in the 1997 Field Procedure For Preparing Seafood Samples For Toxic Analyses (Attachment 2). Three composite samples of each target species will be collected from each site. Each composite sample of finfish and blue crab sample will contain five individuals with the smallest individual at least 75% of the size of the largest individual. The size of finfish collected should be representative of what the public is expected to catch and consume. Sample requirements for each site are shown in Table 1. This protocol should result in 48 samples for laboratory analyses.

Laboratory Analysis

EPD will acquire samples from CRD and transport them on dry ice to the EPD Laboratory in Atlanta, for analyses. All samples collected will be analyzed for 43 contaminants (metals, organic compounds, and pesticides) identified in Attachment 1. These chemicals are routinely monitored in all fish collected by EPD statewide. After samples have been analyzed, the data will be evaluated by EPD and CRD for development of consumption guidelines for seafood in the Terry and Dupree Creek area.

Guideline Development

In 1994, the Georgia Environmental Protection Division (EPD) began using risk analyses to develop risk-based consumption guidelines for the general fishing public for many waterbodies in the state. EPD conducts a comprehensive evaluation of multiple contaminants, and then develops consumption guidance that is easy to understand. EPD's approach is described in detail in the "1992 Recommendations For A Fish Tissue Monitoring Strategy For Freshwater Lakes, Rivers, and Streams". This method is also consistent with approaches recommended by U.S. EPA in "Guidance For Assessing Chemical Contaminant Data For Use In Fish Advisories, Vol 1 Fish Sampling And Analysis, Second Edition (1995)" and "Vol 2 Risk Assessment And Fish Consumption Limits (1994)". After guidelines are developed, they will be made available through a press release and will also be added to the 1998 edition of the Georgia Sport Fishing Regulations and 1998 Guidelines for Eating Fish from Georgia Waters booklet.



Attachment 1

Parameters and Detection Limits for Fish/Seafood Samples

<u>Parameter</u>	<u>Detection Limit</u> (mg/kg)
<u>METALS (mg/kg)</u>	
Antimony	1
Beryllium	1
Cadmium	1
Chromium, Total	1
Copper	1
Lead	1
Mercury	0.01
Nickel	1
Silver	1
Thallium	1
Zinc	1
<u>PESTICIDES/PCB (mg/kg)</u>	
Aldrin	0.01
a-BHC	0.01
b-BHC	0.01
d-BHC	0.01
g-BHC (Lindane)	0.01
Chlordane	0.04
4,4-DDD	0.01
4,4-DDE	0.01
4,4-DDT	0.01
Dieldrin	0.01
Endosulfan I	0.02
Endosulfan II	0.03
Endosulfan Sulfate	0.05
Endrin	0.01
Endrin Aldehyde	0.05
Heptachlor	0.01
Heptachlor Epoxide	0.01
Toxaphene	0.1
PCB-1016	0.1
PCB-1221	0.1
PCB-1232	0.1
PCB-1242	0.1
PCB-1248	0.1
PCB-1254	0.1
PCB-1260	0.1
PCB-1268	0.1
Methoxychlor	0.05
HCB	0.01
Mirex	0.1
Pentachloroanisole	0.01
Chlorpyrifos	0.05
Total Lipid	%

Table 1
Sample Collections @ Each Sample Location

Species	Preparation	Size of Each Composite	# of Composites per Location	Total # Individuals
Shrimp	Heads off and peeled	300-400 grams	3	3 Bags of Shrimp
Blue Crabs	Lump and claw meat only	5 individuals	3	15 Crabs
Fish Species Common Creel	Fillets (skin on scales off)	5 individuals	3	15 Fish
Fish Species Common Creel	Fillets (skin on scales off)	5 individuals	3	15 Fish

Attachment 2**Methodology****1997****FIELD PROCEDURE FOR PREPARING
SEAFOOD SAMPLES FOR TOXIC ANALYSES****PROJECT: BRUNSWICK (Terry and Dupree Creeks)****STEP A**

Collect Seafood Samples. At each sampling location target species will be collected. Samples may be held on wet ice for up to 24 hours before preparation.

STEP B

Sample Preparation. Fish samples will be three replicate composites of edible flesh (fillets), skin on, scales off including belly flap, rib cage removed. There should be five fish in each of the 3 composite for a total of 15 fish from each sample location. Each species composite will be of similar size (length) fish. The smallest fish in a replicate will be at least 75% of the largest.

Blue crab tissue samples will consist of the lump and claw meat from five individuals (legs, carapace, and viscera removed). Three composites are requested per sample site for a total of 15 crabs at each sample location.

Shrimp samples will be 300-400 grams (10-13 oz.) head off and peeled. Three composites are requested for a total of 3 bags (10 to 13 oz. each) of shrimp at each sample location.

Stainless steel filleting knives and impervious cutting boards are required. The work station should be arranged so as to provide a clean work space that can be renewed between each

sample. Aluminum foil or plastic back bench cover can be replaced between each composite to prevent cross contamination. Knives, scaling tools, and cutting boards should be cleaned between composites. Also, all record keeping, sample identification and logging duties should be performed by a second individual in attendance specifically for that purpose.

The first step in sample preparation of each species from a field station should be segregated and grouped by size. This can be done by first weighing and measuring each fish and recording this information on a tag. A 6 3/4 in x 3 1/8 in yellow identification tag has been used successfully. A black permanent marker is recommended. A plastic tie can be used to attach the tag to the lower jaw. After grouping by size an individual/ composite number can be added to the tag which should also indicate the species, water body, location, date, and person responsible for collection. This tag should stay with the fish through processing and end up in the package containing the two filets.

Two filets should be wrapped separately in heavy duty aluminum foil (shiny side out). The two filets plus the tag should be placed in a zip lock plastic bag so that the tag can be read through the bag. Zipper Sandwich Bags (6 5/8 in. x 5 7/8 in.) work well.

All the plastic bags containing two fillets and an identification tag are placed in a larger plastic bag. This constitutes the composite sample. All the fish in this bag will be ground up in the lab and analyses run. Food Storage Bags gallon size (11 1/2 in. x 12 1/2 in.) are recommended.

This method of sample preparation has been tested and it works. The metal free ties and tags maintain sample integrity from start to finish. The aluminum foil keeps the filets protected. The sandwich bags keep the two fillets and tag together. The gallon size plastic bag keeps composite fish together.

It is most important to stress attention to anything that might be transferred to the sample through touching foreign objects and then the sample. Work should be conducted in a clean area, bench covers should be changed and utensils should be cleaned between composites to prevent cross contamination.

After sample preparation samples should be frozen and should remain frozen until preparation for analyses in the laboratory begins.

STEP C

Paper Work

Individual Fish Sample Tag. This has been described earlier under sample preparation. An example is attached.

Lab Data Sheet. This is MOST important! This is the sheet on which the lab identification number will be recorded when the samples reach the lab. There should be a separate lab sheet for each target species from each location. A copy is attached.

Chain of Custody Form. This document identifies the people responsible for the samples from field collection through processing, storage and transport all the way to the lab. A copy is attached.

Individual Sample Tag

The diagram shows a sample tag with the following fields and labels:

- Month/Day/Year**: 03/21/97
- Water Body**: Terry Creek
- Person Responsible**: D. Roberson
- Location**: Lanier Basin/Overlook
- Species (Common Name)**: Black Drum
- Weight (g)**: 157 g
- Length (mm)**: 236 mm
- 5th Fish / 2nd Composite**: 5/2

The tag also features two black dots on the left side.

1997 LAB DATA SHEET

Program: _____

Water Body: _____

Collector: _____

Location: _____

Collection Date: _____

Species: _____

LAB USE

REPLICATE/COMPOSITE #1

Total Length (mm)	Weight (g)
-------------------	------------

REPLICATE/COMPOSITE #2

Total Length (mm)	Weight (g)
-------------------	------------

REPLICATE/COMPOSITE #3

Total Length (mm)	Weight (g)
-------------------	------------

**Weight of Aliquot
for Composite (g)**

Archive #

Weight of Aliquot
for Composite (g)

Archive #

Weight of Aliquot
for Composite (g)

Archive #

COMMENTS:

15 8 0013

DEPARTMENT OF NATURAL RESOURCES
ENVIRONMENTAL PROTECTION DIVISION
205 BUTLER STREET, SE
FLOYD TOWERS EAST
ATLANTA, GEORGIA 3034

Receipt for Samples

Sample Collector: _____

Address: _____

Phone #: _____ Fax #: _____

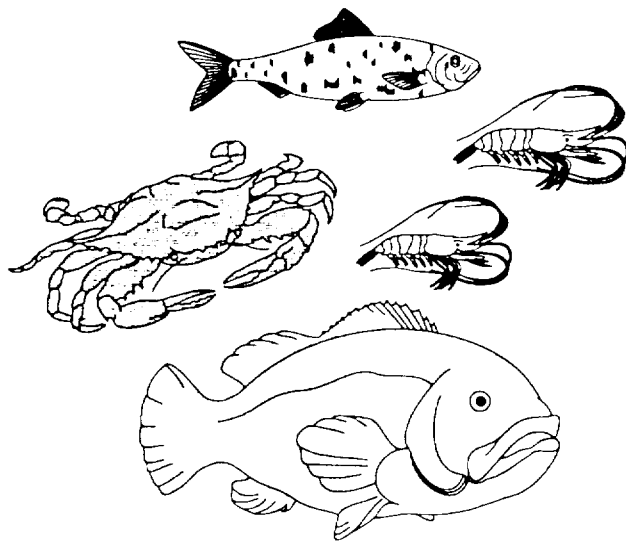
ITEM	QUANTITY	DESCRIPTION OF SAMPLE

I certify that I have received sample listed above

Date _____ Name _____ SIGNATURE _____

Chain of Custody

ITEM	DATE	RELINQUISHED BY	RECEIVED BY	COMMENTS



17 0 0015

TABLE 1
PARAMETERS AND DETECTION LIMITS FOR FISH SAMPLES

<u>Parameter</u>	<u>Detection Limit (mg/kg)</u>
<u>METALS</u>	
Antimony	1
Arsenic	0.02
Beryllium	1
Cadmium	1
Chromium, Total	1
Copper	1
Lead	1
Mercury	0.01
Nickel	1
Selenium	0.02
Silver	1
Thallium	1
Zinc	1
<u>Pesticides/PCB</u>	
Aldrin	0.01
a-BHC	0.01
b-BHC	0.01
d-BHC	0.01
g-BHC (Lindane)	0.01
Chlordane	0.03
4,4-DDD	0.01
4,4-DDE	0.01
4,4-DDT	0.01
Dieldrin	0.01
Endosulfan I	0.02
Endosulfan II	0.03
Endosulfan Sulfate	0.05
Endrin	0.01
Endrin Aldehyde	0.05
Heptachlor	0.01
Heptachlor Epoxide	0.01
Toxaphene	0.1
PCB-1018	0.03
PCB-1221	0.03
PCB-1232	0.03
PCB-1242	0.03
PCB-1248	0.03
PCB-1254	0.03
PCB-1260	0.03
Methoxychlor	0.05
HCB	0.01
Mirex	0.10
Pentachloroanisole	0.01
Chlorpyrifos	0.01
Total Lipid	0.10%

*State
Detection
Limits*

Georgia Department of Natural Resources

205 Butler Street, S.E., East Floyd Tower, Atlanta, Georgia 30334

Lonice C. Barrett, Commissioner

Harold F. Reheis, Director

Environmental Protection Division

March 6, 1997

17 8 0016

Leo Francendese
Federal On-Scene Coordinator
USEPA, Region IV
WMB/ERRB
Atlanta Federal Center
100 Alabama Street
Atlanta, Georgia 30303

Dear Leo:

Enclosed is the study plan for the Terry and Dupree Creek area. Feel free to contact me if you have any questions.

Sincerely,



Randall O. Manning, Ph.D., D.A.B.T.
Environmental Toxicology Coordinator

enclosure